

Supporting Information

Enhancement of Sono-Fenton by P25-Mediated Visible Light Photocatalysis: Analysis of Synergistic Effect and Influence of Emerging Contaminant Properties

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Table S1. Chemicals and materials used in this study.

Reagent Name	Molecular Formula	Molecular Weight	Purity	Brand
DMP	C ₁₀ H ₁₀ O ₄	194.19	99%	Sigma-Aldrich
DEP	C ₁₂ H ₁₄ O ₄	222.24	99.5%	Sigma-Aldrich
methanol	CH ₄ O	32.04	HPLC	TEDIA
ethanol	C ₂ H ₆ O	46.07	AR	TEDIA
phosphoric acid	H ₃ PO ₄	98	HPLC	Sigma-Aldrich
sulfuric acid	H ₂ SO ₄	98.08	AR	Sinopharm
acetic acid	C ₂ H ₄ O ₂	60.05	GR	Sinopharm
anhydrous sodium acetate	C ₄ H ₃ O ₂ Na	82	AR	Sinopharm
sodium hydroxide	NaOH	40	AR	Sinopharm
1,10-phenanthroline	C ₁₂ H ₈ N ₂	180.21	AR	Sinopharm
ferric chloride hexahydrate	FeCl ₃ ·6H ₂ O	270.29	>97%	Sigma-Aldrich
ferrous sulfate	FeSO ₄ ·7H ₂ O	278.01	AR	Sigma-Aldrich
P25	TiO ₂	79.9	99.5%	Degussa
hydrogen peroxide	H ₂ O ₂	34.1	AR	Sinopharm

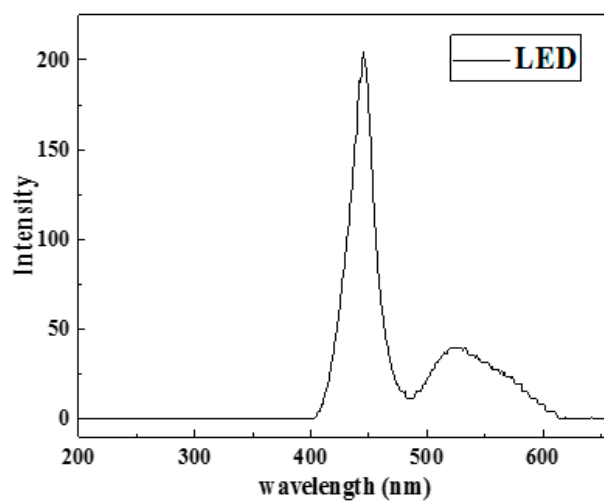


Figure S1. The emission spectrum of the LED lamp used in this study.

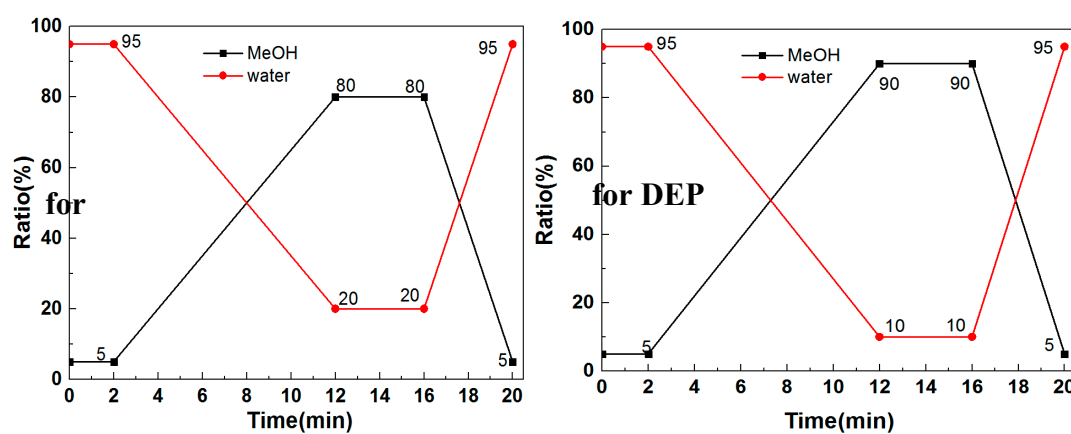


Figure S2. The gradient programme of the mobile phase (mixture of methanol and water) for the separation of intermediates.

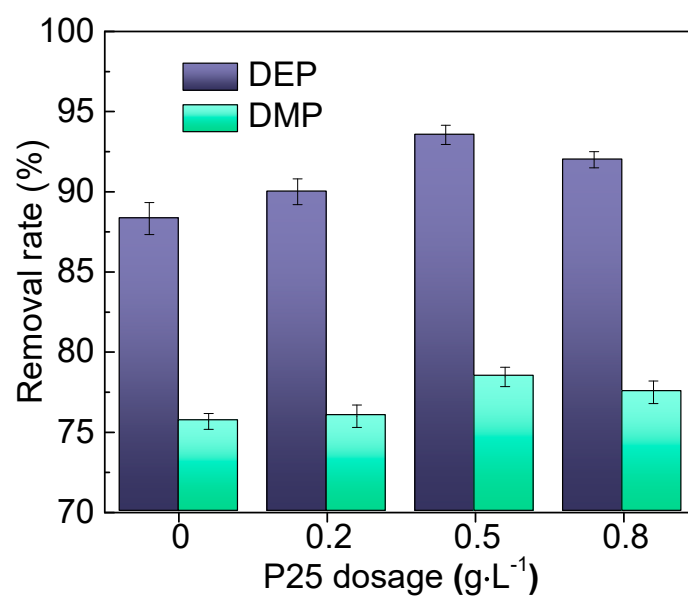


Figure S3. Influence of P25 with varied dosages on ultrasonic degradation of DEP and DMP (solution volume 250 mL, reaction time 60 min, $[DMP]_0 = 0.01$ mM, $[DEP]_0 = 0.01$ mM).

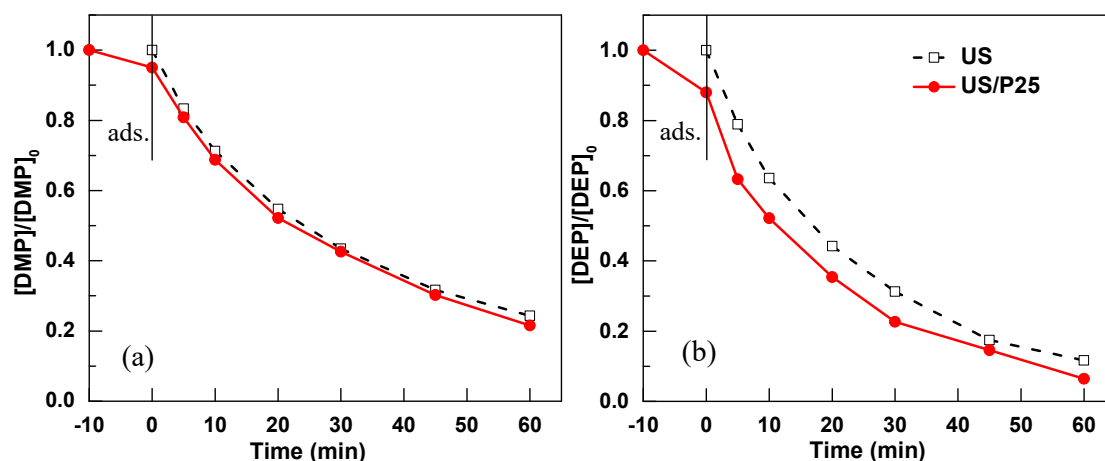


Figure S4. Effect of P25 on the ultrasonic degradation of DMP or DEP (solution volume 250 mL, $[DMP]_0 = 0.01$ mM, $[DEP]_0 = 0.01$ mM, P25 0.5 g L^{-1} , adsorption time 20 min).

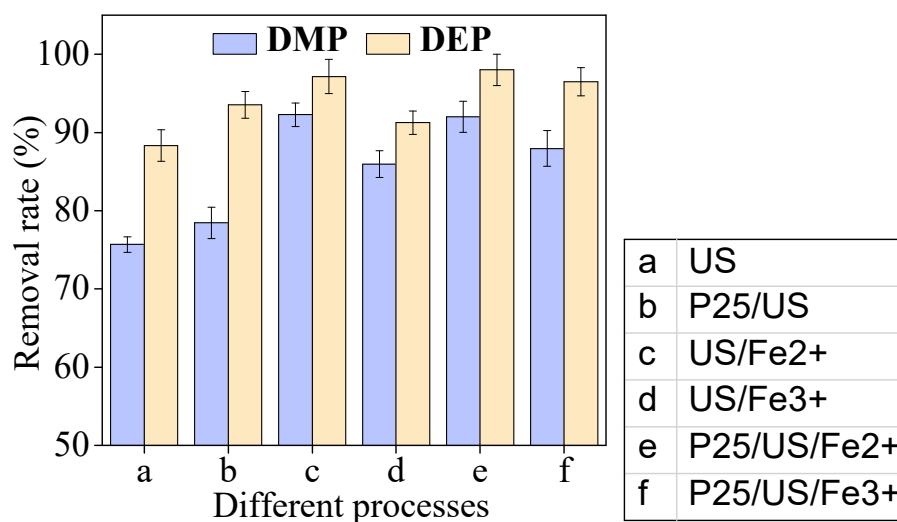


Figure S5. Comparison of 60 min removal rates for both DMP and DEP in different processes ($[DMP]_0 = 0.01$ mM, $[DEP]_0 = 0.01$ mM, P25 dosage 0.5 g L^{-1} , adsorption time 20 min, $[Fe^{2+}]_0 = 0.5$ mM, $[Fe^{3+}]_0 = 0.5$ mM).

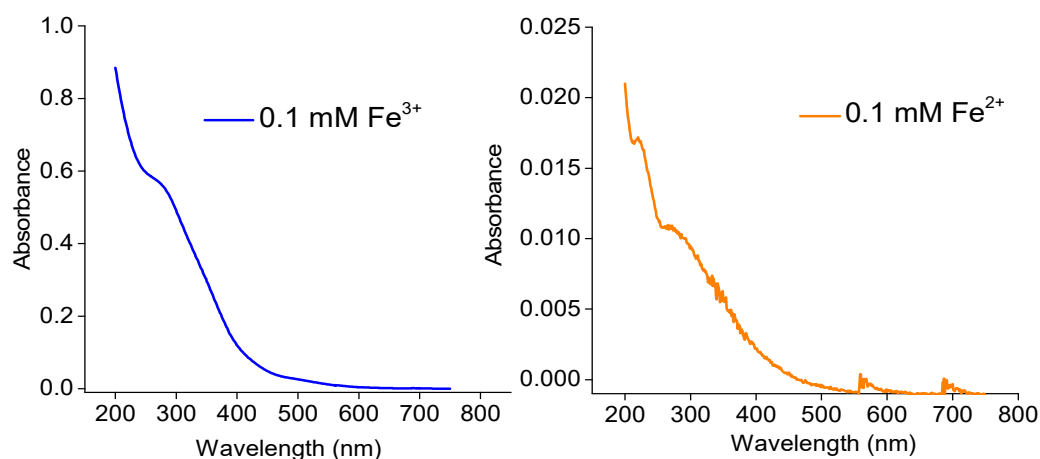


Figure S6. The UV-vis absorption spectra of 0.1 mM $FeCl_3$ water solution and 0.05 mM Fe_2SO_4 (0.1 mM Fe^{2+}) solution at pH 3.3.

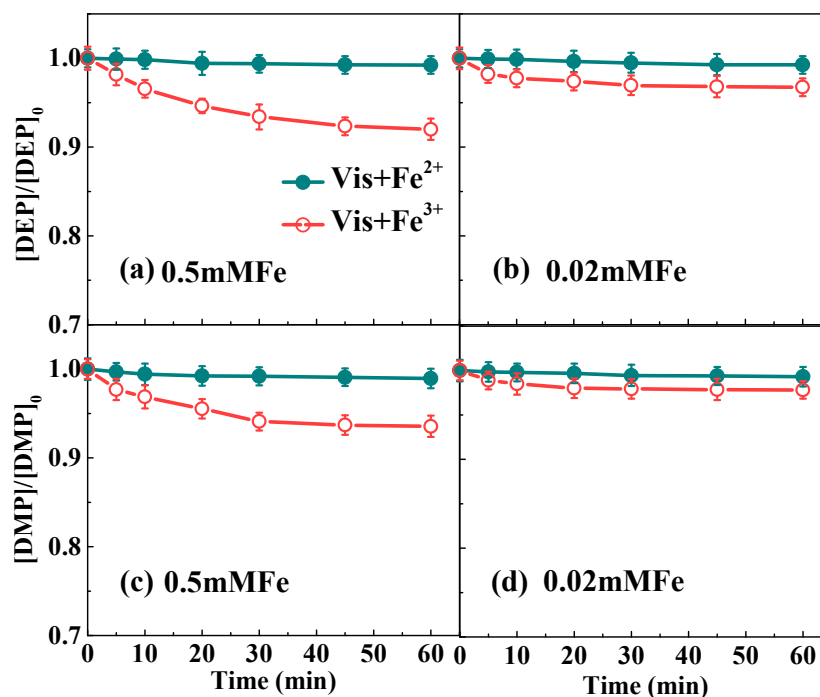


Figure S7. The degradation of DMP and DEP in the processes combining visible light with different concentrations of $\text{Fe}^{2+}/\text{Fe}^{3+}$ ($[\text{DMP}]_0 = 0.01 \text{ mM}$, $[\text{DEP}]_0 = 0.01 \text{ mM}$).

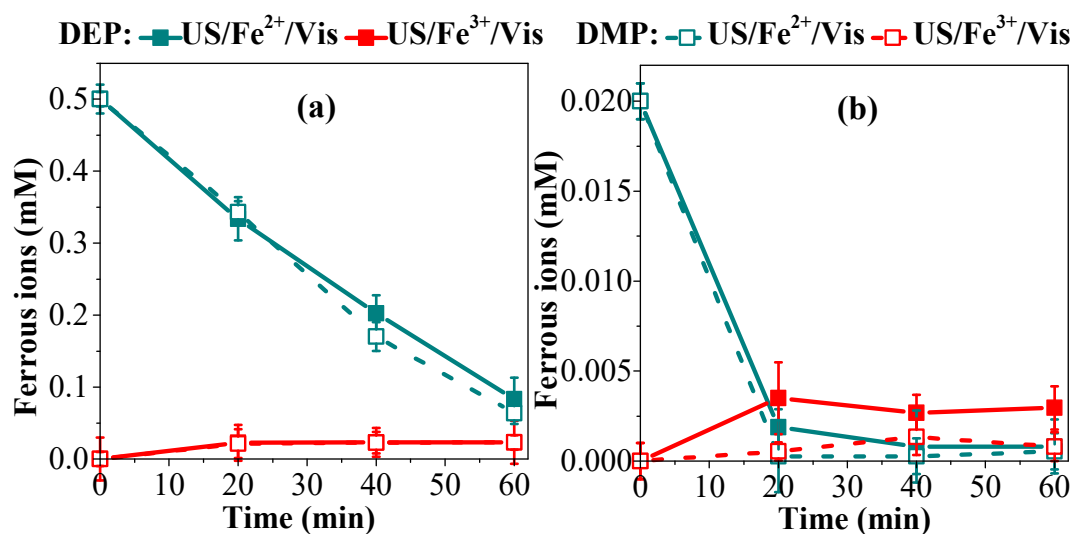


Figure S8. Variation of ferrous ion concentrations during the degradation of DMP or DEP in visible light assisted sono-Fenton processes at two different levels of iron species: (a) 0.5 mM, (b) 0.02 mM ($[\text{DMP}]_0 = 0.01 \text{ mM}$, $[\text{DEP}]_0 = 0.01 \text{ mM}$).

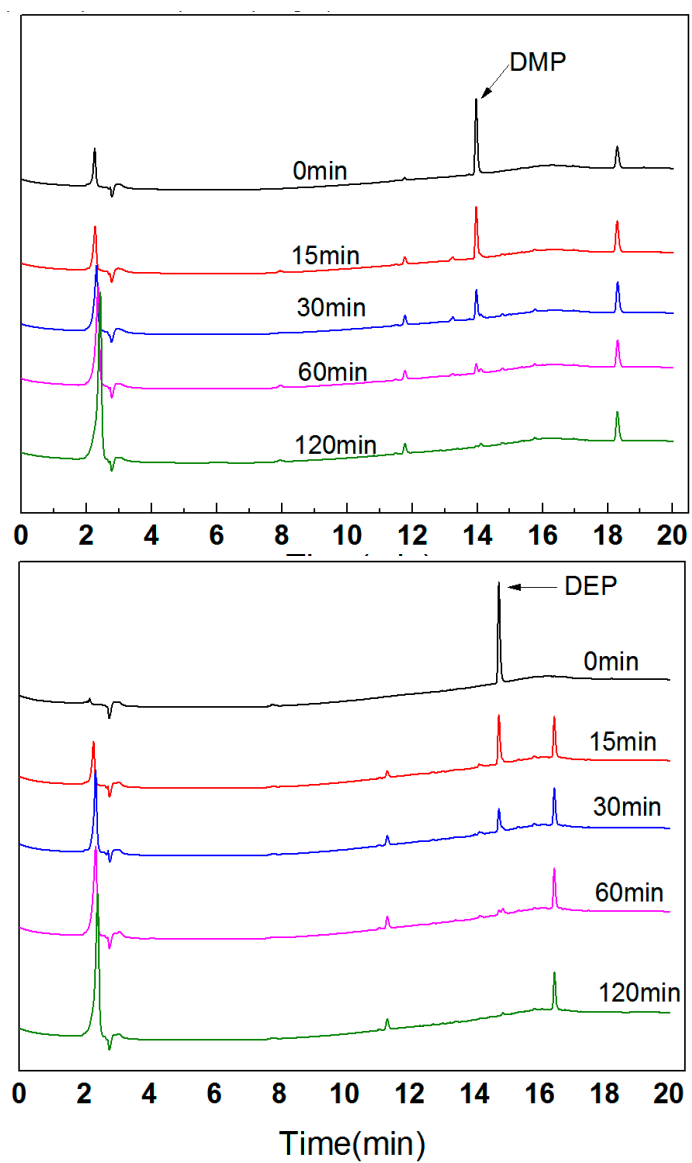


Figure S9. The profiles of HPLC spectra during the degradation of DMP and DEP ($[DMP]_0 = 0.05$ mM, $[DEP]_0 = 0.05$ mM, P25 dosage 0.5 g L^{-1} , $[Fe^{3+}]_0 = 0.02$ mM).

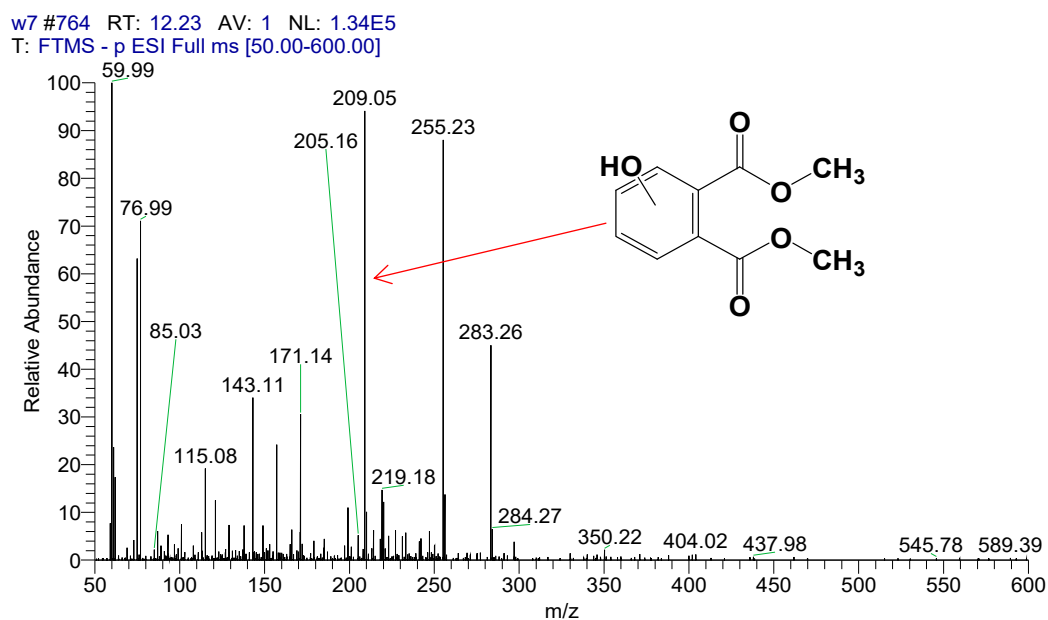
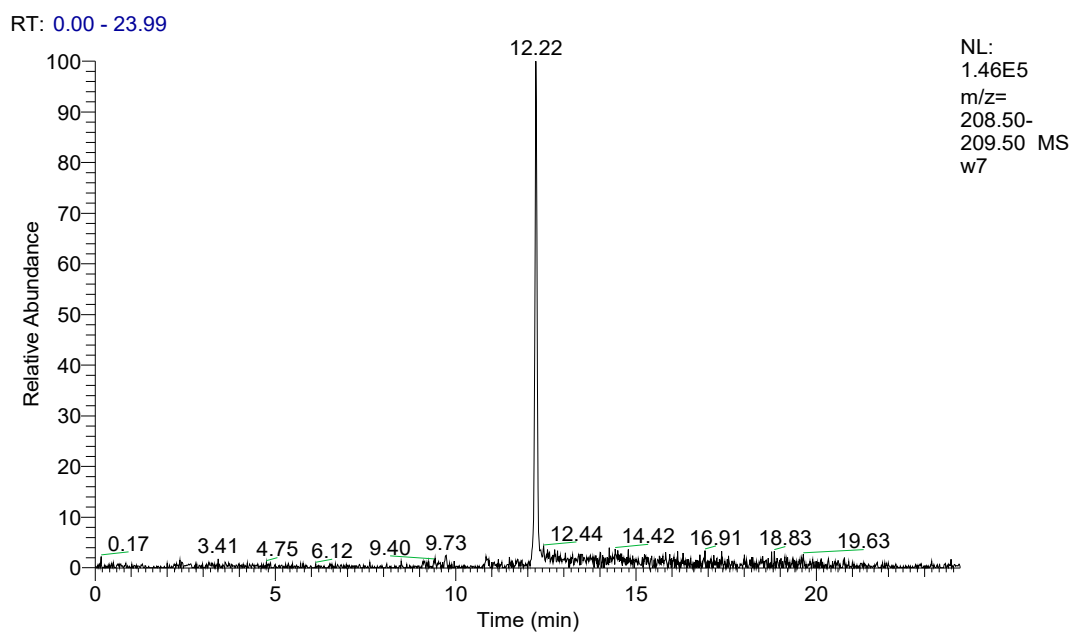


Figure S10. The mass spectra of hydroxylated-dimethyl phthalate with m/z 210 and 209 ($M-H$)⁻.